

NATIONAL NUCLEAR SECURITY BUSINESS LINE

The Department of Energy is required by various laws to enhance U.S. national security through the military application of nuclear technology and to reduce the global danger from the proliferation of weapons of mass destruction. The National Nuclear Security Administration (NNSA), a semi-autonomous Administration within the Department, carries out these responsibilities. Established in March 2000 pursuant to Title 32 of the National Defense Authorization Act for FY 2000 (Public Law 106-65), NNSA is structured to provide clear and direct lines of accountability and responsibility for the management and operation of the Nation's nuclear weapons, naval reactors, and nuclear nonproliferation activities.

Three major offices within NNSA carry out the Department's national nuclear security mission. The Office of Defense Programs (with an annual budget of about \$4.6 billion) is responsible for maintaining the safety, security, and reliability of the U.S. nuclear weapons stockpile. The Office also maintains the capability to design and produce nuclear weapons and maintains the capability to resume underground nuclear testing. The Office of Naval Reactors (with an annual budget of about \$700 million) provides the U.S. Navy with safe, militarily effective nuclear propulsion plants. Naval Reactors ensures the safe and reliable operation of those plants—beginning with technology development, continuing through reactor operation, and ultimately, disposing of the reactors plants. The Office of Defense Nuclear Nonproliferation (with an annual budget of about \$800 million) is responsible for promoting international nuclear safety and nonproliferation by implementing major

nonproliferation programs and providing key analytical and technical support to international agreements related to weapons of mass destruction. The Office is also responsible for: research and development of technologies to detect proliferation; implementation of the Highly Enriched Uranium Purchase Agreement; elimination of surplus U.S. weapons plutonium and highly enriched uranium; and assistance to help Russia eliminate its surplus weapons-grade plutonium.

Four staff offices outside of the NNSA retain policy, oversight, and some national security responsibilities: the Offices of Security and Emergency Operations, the Office of Intelligence, the Office of Counterintelligence, and the Office of Independent Oversight and Performance Assurance. The Office of Worker Transition and Community Assistance, which is also outside of NNSA, manages programs to minimize the social and economic impacts of changes in the Department's activities.

Situation Analysis

The national security environment is becoming increasingly complex for the United States. For



Computer Scientist and Mathematician Terri Calton of Sandia National Laboratories, Albuquerque, New Mexico, reviews design specifications for the B61 tail assembly shown in the foreground and on the screen behind her.

almost 50 years, America's national security has relied on the deterrent provided by nuclear weapons. Designed, built, and tested by the Department of Energy and its predecessor agencies, these weapons helped to win the Cold War, and they remain a key component of the Nation's security posture. With the end of the Cold War, the Department faces a new and complex set of challenges in its national nuclear security mission. One of the most critical challenges is being met by the Stockpile Stewardship Program, established by Congress in 1993. As directed by the President, this program is maintaining the nuclear deterrent in the absence of underground nuclear testing. Another critical challenge is the proliferation of weapons of mass destruction (WMD) and nuclear weapons materials. It is one of the most serious dangers the United States now faces.

Nuclear Weapons Stockpile Stewardship.

Exercising world leadership in arms control, the United States halted production of nuclear warheads and declared a moratorium on underground nuclear testing in the early 1990s. In 1993, President Clinton continued the moratorium on nuclear explosives testing and initiated the Stockpile Stewardship Program, challenging the DOE and the DoD "to explore other means of maintaining our confidence in the safety, reliability, and performance of our weapons." The President also directed the Department to retain the capability to resume underground nuclear testing within three-years of a decision to do so, should it ever be necessary.

As weapons, facilities, and experienced personnel continue to age, maintaining the safety, security, and reliability of the nuclear deterrent in the absence of underground nuclear testing is becoming a more difficult, yet achievable, task. The Stockpile Stewardship Program requires significant advances and future investments in computing and experimental capabilities, and in



Senator Richard Lugar at the Cooperative Threat Reduction (CTR) converter factory.

new technologies and facilities. Ensuring the 40 plus year old complex can react to program challenges while meeting today's operational standards continues to be a daunting task. Maintaining institutional knowledge about nuclear weapons is also a challenge. In a highly competitive market for computer science, engineering, and technical talent, skilled workers must be recruited and then trained by more experienced staff within the NNSA workforce. Many of those with years of experience are reaching retirement age or, in some cases, being attracted to other career opportunities.

Stockpile Stewardship and Nuclear Arms

Control. The Stockpile Stewardship Program is carried out in full consonance with and supportive of START agreements and other nuclear nonproliferation initiatives. The President's moratorium on nuclear testing is designed to encourage other nations to also refrain from nuclear testing. Activities within the Stockpile Stewardship Program directly support the *Nuclear Weapons Stockpile Plan* (NWSP), which is approved by the President on an annual basis. The current NWSP requires DOE to sustain the stockpile levels specified in the START I Treaty until START II enters into force, and then to retain the capability to reconstitute the stockpile to START I levels.

Future arms control agreements, such as the START III Treaty now being discussed, are expected to further reduce deployed strategic nuclear forces. This will increase inventories of surplus plutonium and highly enriched uranium in the United States and Russia. Already, hundreds of tons of weapons plutonium and highly enriched uranium in both countries are no longer needed for defense purposes. To eliminate the danger of unauthorized use or diversion of surplus fissile materials, the current excess inventories—as well as additional excess material from future arms reductions—must be disposed of expeditiously. The United States and the Russian Federation are now in the fifth year of a 20-year contract to convert 500 metric tons of weapons grade uranium from dismantled Russian nuclear weapons into low-enriched uranium, which will be fabricated into fuel elements for commercial nuclear power reactors in the United States.

Nonproliferation. In November 1994, President Clinton stated, “The proliferation of weapons of mass destruction continues to pose an unusual and extraordinary threat to the national security, foreign policy, and economy of the United States.” At least 20 countries are known to be or are suspected of developing weapons of mass destruction—a sobering statistic that is underscored by the underground nuclear tests conducted by India and Pakistan in 1998. In an Executive Order issued in July 1998, the President declared that the proliferation of nuclear, biological, and chemical weapons and the means of delivering such weapons constitutes a national emergency.

The fragmentation of the former Soviet Union (FSU) has led to particular concerns about the accountability, control, and disposition of nuclear weapons, components, materials, and information. The safety and security of existing nuclear weapons and materials stockpiles may become increasingly at risk should the overall situation deteriorate in FSU countries. In 1994, a



Warhead and Fissile Material Transparency Lab-to-Lab Program technical experts view a radiation measurement demonstration at Chelyabinsk-70.

National Academy of Sciences report stated that the threat of nuclear weapons or materials falling into the hands of terrorists or states of concern through theft or diversion is a “clear and present danger.”

Our domestic security is increasingly dependent on our ability to detect and counter nuclear, chemical, biological, and cyber weapons. In the area of nuclear weapons, our security continues to depend on our ability to prevent nuclear materials from falling into the wrong hands. It is essential that we develop technologies and systems to monitor, protect, and account for nuclear materials—and to dispose of them. Further, our technologies must keep pace with the increasingly sophisticated means used by smugglers or thieves to remove such material from safekeeping in sites throughout Russia and other countries. For chemical and biological threats, we must develop new sensors and detectors. And, in addition, we must train and equip teams to respond to incidents. Finally, the Nation has an infrastructure that is more and more dependent on computer technology and telecommunications services to provide vital services, such as those provided by the energy sector. While such technologies provide enormous benefits, they are extremely vulnerable to cyber attacks. At the same time, assets, such as power plants,

transmission lines, and oil storage facilities are also vulnerable to physical attack.

Naval Reactors. International events and crises continue to arise to which the United States must respond. The resources of the United States Navy are frequently called on to project a forward presence and quickly protect our national interests. Nuclear powered submarines and aircraft carriers must perform safely, reliably, and effectively as they meet military deployment objectives. In the next decade, the Navy plans to commission a new Virginia class of attack submarines and in 2013, the Navy will commission a new CVNX class of aircraft carriers to meet its evolving national defense responsibilities for the first part of the 21st century.

Key External Factors

Most of the programs in the National Nuclear Security Business Line (NNSBL) focus on nuclear weapons, nuclear facilities, nuclear processing, transportation of nuclear materials, and nonproliferation aspects of nuclear power. Other programs focus on international efforts to reduce the global danger posed by weapons of



Second Line of Defense ribbon cutting ceremony at Sheremetyevo International Airport, Moscow. Left to Right: Sec. Richardson, Sen. Domenici, Customs Chairman Dragonov and Customs Department Head Kravchenko.

mass destruction. The prime external factor potentially affecting performance in all areas is the public's perception of these national nuclear security issues. To maintain public support, each of the programs in the NNSBL maintains high standards related to environment, safety, health, and security, and makes every effort to communicate with the public on these matters. Hence, an effective program of stakeholder communication is important. Public support, in turn, dictates Congressional support for national nuclear security programs.

Interagency Crosscutting Coordination

DOE integrates national nuclear security work with the efforts of many other agencies of the U.S. government. Principally, DOE coordinates its nuclear weapons stockpile activities with the Department of Defense through the Nuclear Weapons Council and the Stockpile Stewardship Interagency Executive Review Group, which includes key officials and experts in the national security community. For naval nuclear propulsion work, the U.S. Navy and the Department have a unique partnership, defined in an Executive Order and Title 42 of the U.S.C. Section 7158. For nonproliferation and arms control programs, the National Security Council coordinates policy. The State Department is the lead agency for all policy matters dealing with other countries. Within this community of agencies, DOE maintains the nuclear stockpile, provides technical support for treaty negotiation, verification and compliance, and develops technical capabilities for detecting the proliferation of weapons of mass destruction. In addition, the Department provides technical support for the international effort to control proliferation of fissile materials. To dispose of excess fissile materials that had been used in U.S. and Russian nuclear weapons, DOE uses the expertise of the United States Enrichment Corporation (USEC, Inc.), which is purchasing Russian-origin uranium, and the Tennessee Valley

Authority to dispose of U.S. highly enriched uranium. In addition, the Nuclear Regulatory Commission regulates the activities where DOE makes use of the capacity of the U.S. commercial nuclear industry.

In the areas of security and emergency operations, DOE participates in interagency groups such as the Joint Security Policy Board, and works with the Departments of Defense, State, and Justice, and the National Security Council. In response to threats of terrorism and weapons of mass destruction, DOE is working with these same agencies to train and equip first responders and to conduct exercises that include local law enforcement. The Technical Support Working Group, with representation from these agencies, promotes an exchange of technologies developed to counter threats and improve both our security systems and our ability to protect our facilities.

Congressional and Stakeholder Consultations

DOE consults with Congress frequently as Congress reviews our programs during the annual authorization and appropriation process. As a result, DOE modifies its performance measures and strategies to reflect direction provided in authorization acts and funding provided in appropriations. In addition, DOE modifies its measures and strategies to incorporate input from stakeholders and from program evaluations and analysis as discussed in the next section.

Program Evaluation and Analyses

The mission for DOE's national nuclear security programs is contained in the Atomic Energy Act of 1954, as amended, and Title 32 of the National Defense Authorization Act for Fiscal Year 2000, Public Law 106-65. The objectives,

performance measures, and strategies are strongly influenced by a number of internal and external reviews and reports that, collectively, provide the Department's program managers with appropriate information to properly orient programs and budgets and maintain a balanced set of activities.

Nuclear Weapons Stockpile Stewardship.

For nuclear weapons stockpile activities, the performance measures and strategies are embodied in the *Stockpile Stewardship Plan*. They are driven by requirements set by Presidential Decision Directives and by the technical activities and capabilities needed for the Annual Certification process. On April 5, 2000, the Annual Certification Memorandum was transmitted to the President by the Secretaries of Energy and Defense. This is the fourth consecutive year in which the capabilities of the Stockpile Stewardship Program have been used to assess and inform the President that the stockpile remains safe, secure, and reliable, and that no underground nuclear testing is required at this time.

DOE updates the *Stockpile Stewardship Plan* annually and incorporates the results into work plans. In addition, DOE has recently completed its *National Security Technology Roadmapping of the Research and Development Portfolio* to ensure that the suite of R&D programs is fully supportive of the Stockpile Stewardship Program. Finally, a number of internal and external evaluations and analyses also provided information used to update program performance measures and strategies. They include:

- M The Secretary's *30-Day Review of the Stockpile Stewardship Program* conducted in late 1999, concluded that stockpile stewardship is on track, both in terms of specific science, surveillance, and production accomplishments, and in terms of developing a program management structure that improves the

process for certifying the safety, security, and reliability of the nuclear weapons stockpile. The Review also found that additional pressures such as increased security requirements, newly discovered stockpile issues, and resource limitations have collectively forced the program, overall, to be “wound too tight” with too little program flexibility or contingencies.

- M Concerns over the loss of key personnel within the DOE’s nuclear weapons complex led to a Congressionally directed report by the Commission on Maintaining U.S. Nuclear Weapons Expertise. The report offered 12 recommendations to support the recruitment and retention of scientific, engineering, and technical personnel for the nuclear weapons program. Implementation of these recommendations is ongoing. A Congressionally-mandated follow-up report entitled, *Nuclear Skills Retention Measures within the Department of Defense and the Department of Energy*, will be issued by December 2000.
- M Section 3158 of the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999 (Public Law 105-261) directed the Secretary of Energy to develop clear and specific criteria for judging whether the science-based tools that are being used by DOE are performing in a manner that will provide an adequate degree of certainty that the stockpile is safe and reliable. In meeting this commitment, DOE submitted a report to Congress in June 2000, that included a description of the information needed to determine that the nuclear weapons stockpile is safe and reliable, and the



Extraction generator used to synthesize radiopharmaceuticals. With funding from the Initiatives for Proliferation Prevention programs, Pacific Northwest National Laboratories and the Khoplin Radium Institute partnered to develop the methodology to synthesize ⁹⁹Tc radiopharmaceuticals, which are sold to hospitals in the St. Petersburg, Russia, area. These products provide treatment for over 12,000 patients.

relationship of the science-based tools to the collection of that information. As directed by Section 3159, of Public Law 105-261, an independent panel was established to examine the certification process as well as the criteria developed to comply with Section 3158.

Naval Reactors. For the Naval Reactors program, the performance measures and strategies reflect the long-standing partnership through which the Department of Energy provides the U.S. Navy with naval nuclear propulsion systems. Semi-annual reviews of performance, in addition to monthly financial and technical work reviews with the government contractor routinely evaluate the progress of these efforts.

Nonproliferation Activities. Nonproliferation and national security programs within the Office of Defense Nuclear Nonproliferation benefit from the advice of the Nonproliferation and National Security Advisory Committee which reviews its activities. In addition, the Materials Protection, Control, and Accounting Program has been examined by the National Research Council, the General Accounting Office, and the Department’s

Inspector General. These studies and other information provided by the program's technical survey team resulted in a programmatic reassessment in 1999. The Department's work in Russia is also subject to review by a special Task Force of the Secretary of Energy Advisory Board.

For fissile materials disposition efforts within the Office of Defense Nuclear Nonproliferation, the performance measures and strategies reflect Records of Decision from environmental reviews as well as a technical baseline reviewed by independent experts selected by the National Academy of Sciences. In addition, as required by Congress, DOE conducted an independent project review of the three planned U.S. plutonium disposition facilities. Finally, the United States and Russia recently agreed to the top-level schedule to dispose of their own plutonium. This agreement will guide subsequent programmatic activities and provide a means to track those activities.

Resource Requirements

Consistent with the Administration's outyear budget projections, the activities in this business line are expected to be funded at about \$7 billion each year. The Department will continue to identify resources within the 050 National Defense account (specifically the 053 subfunction, Atomic Energy Defense Activities) to meet its national nuclear security responsibilities. A stable level of funding continues to be important to assure appropriate planning and program performance. The Stockpile Stewardship Program will require significant investments in people, computing and modeling capabilities, experimental facilities, and infrastructure to maintain the safety, security, and reliability of the Nation's nuclear weapons.

Fulfilling personnel resource requirements remains a major challenge. To assure continuity of Stockpile Stewardship, Naval Reactors, and nonproliferation programs, DOE needs a focused effort to recruit and retain key technical and scientific personnel with the appropriate skill mix. In addition, unprecedented growth in nonproliferation operations in Russia requires the Department to strengthen and expand its Moscow Office. Adequate program management and project oversight by Federal staff must be ensured for these highly visible and high-priority programs in Russia.

NATIONAL NUCLEAR SECURITY GENERAL GOAL

Enhance national security through the military application of nuclear technology and reduce the global danger from weapons of mass destruction.

DOE, through the National Nuclear Security Administration, is responsible for the military application of nuclear technology. In the Department, this encompasses activities to maintain the safety, security and reliability of the nuclear weapons stockpile and the Naval Nuclear Propulsion Program. To reduce the global danger from weapons of mass destruction, the Department provides expertise and develops capabilities to detect and help to prevent the proliferation of materials, technology, and expertise related to nuclear, chemical, and biological weapons. DOE is also responsible for eliminating the surplus weapons-usable plutonium and highly enriched uranium of the United States and assisting Russia in similar endeavors.

OBJECTIVE NS1

Maintain and refurbish nuclear weapons in accordance with directed schedules to sustain confidence in their safety, security, and reliability, indefinitely, under the nuclear testing moratorium and arms reduction treaties.

Introduction

DOE pursues a broad range of activities to maintain the safety, security, and reliability of the nuclear weapons stockpile without nuclear testing. The efforts support the *Nuclear Weapons Stockpile Plan* (NWSP) which is approved by the President on an annual basis. The NWSP is a six-year plan developed jointly by the Department of Energy (DOE) and Department of Defense (DoD). It specifies the exact quantities of nuclear weapons, by warhead type and by year, for the entire stockpile. Within the Stockpile Stewardship Program, the specific set of activities that entail work on stockpiled weapons is referred to as Directed Stockpile Work (DSW). It is this collection of activities that enables DOE to achieve Objective NS1. DSW comprises a set of integrated activities that involves DOE through NNSA, the three national laboratories (Los Alamos, Lawrence Livermore, and Sandia), the Nevada Test Site, and the production plants (Pantex, Kansas City, Y-12, and Savannah River) within the nuclear weapons complex. In close coordination with DoD through the Nuclear Weapons Council, DOE plans, evaluates, and schedules the work to be done on each weapon system. The DSW program encompasses surveillance, maintenance, design, and manufacturing activities required to maintain the nuclear weapon stockpile and to conduct the annual certification. The design and manufacturing activities include work to refurbish aging components in weapons as part of the Stockpile Life Extension Program (SLEP). Where existing processes and/or infrastructure can not support DSW activities, Campaigns have been initiated to develop new capabilities to

ensure the continued safety, security and reliability of the stockpile. DSW also includes dismantlement of nuclear weapons removed from the stockpile.

The Objective's Measures

DOE has established the following performance measures. These measures provide the basis by which the Department will know that it has achieved the objective or is making progress toward it. These measures will be translated into annual targets for performance plans and budgets for the Department.

- M Annually report to the President on the need or lack of need to resume underground nuclear testing to certify the safety, security, and reliability of the nuclear weapons stockpile.
- M Meet all annual weapons maintenance and refurbishment schedules developed jointly by DOE and DoD.
- M Meet annual schedules for the safe and secure dismantlement of nuclear warheads that have been removed from the U.S. nuclear weapons stockpile.

The Objective's Strategies

The following strategies describe the way in which the Department will work toward achieving this objective. These activities will be translated into annual budgets and performance plans for the Department.

- M Conduct a program of Directed Stockpile Work (DSW) that supports the Stockpile Life Extension Program (SLEP) and is integrated and linked to Campaigns (see Objective NS2) and Infrastructure (see Objective NS3).
- M Complete surveillance, maintenance, design, and manufacturing activities necessary for the refurbishment and certification of the stockpile as identified in directive schedules.
- M Apply the improved technologies and tools developed by the Campaigns to achieve DSW performance measures.
- M Dismantle nuclear weapons in a safe and secure manner.



Alterations and modifications to weapons systems, such as the B61-11, help exercise critical design and manufacturing skills at the DOE national laboratories and production plants.

OBJECTIVE NS2

Achieve the robust and vital scientific, engineering, and manufacturing capability that is needed for current and future certification of the nuclear weapons stockpile and the manufacture of nuclear weapon components under the nuclear testing moratorium.

Introduction

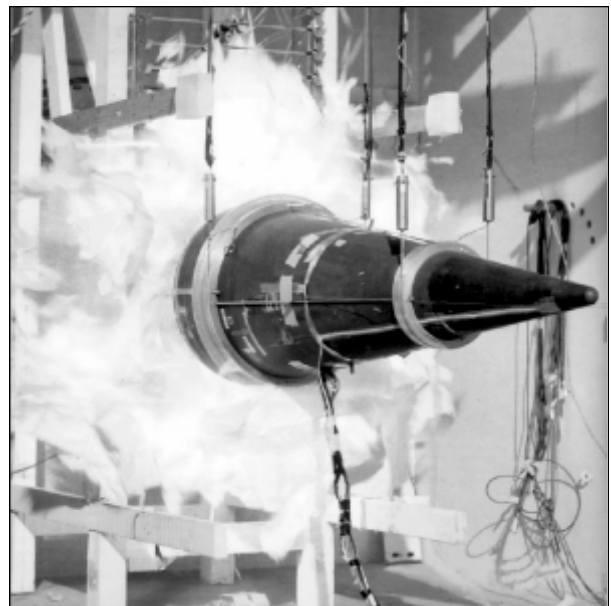
DOE is pursuing activities to achieve the scientific capability that is needed for certification of the nuclear weapons stockpile in the near and long term, and the manufacture of nuclear weapon components under a nuclear testing moratorium. These R&D efforts, which involve close interaction with DoD, are managed through a series of 17 Campaigns. Each is a focused scientific and technical effort that has definitive milestones, specific work plans, and specific goals. Altogether, the Campaigns cover three important areas: science and computing, applied science and engineering, and production readiness.

- M Develop a 36-month capability to respond to projected problems/needs in the nuclear weapons stockpile.
- M Provide a reliable source of tritium no later than FY 2007.

The Objective's Measures

DOE has established the following performance measures. These measures provide the basis by which the Department will know that it has achieved the objective, or is making progress toward it. These measures will be translated into annual targets for performance plans and budgets for the Department.

- M Achieve the stated Campaign goals and the supporting mid-level milestones in accordance with the *Stockpile Stewardship Plan*.
- M Develop increased-teraop computing capability and perform three-dimensional high-fidelity physics and full-system simulations of weapon performance and safety by FY 2004.



Engineering analysis and environmental testing provide vital information about the design of nuclear weapons systems.

The Objective's Strategies

The following strategies describe the way in which the Department will work toward achieving this objective. These activities will be translated into annual budgets and performance plans for the Department.

- M Conduct a series of science and computing Campaigns pertaining to: certification of primaries, secondaries, and weapon engineering; materials properties; advanced radiography; weapon performance in hostile environments; inertial confinement fusion and ignition; and simulation and computing.
- M Conduct a series of applied science and engineering Campaigns pertaining to: advanced design and production technologies; enhanced surveillance; and enhanced surety.
- M Conduct a series of advanced readiness campaigns pertaining to: pit and secondary manufacturing; high explosives manufacturing and weapon assembly/disassembly; non-nuclear components; and tritium production.

OBJECTIVE NS3

Ensure the vitality and readiness of DOE's national nuclear security enterprise.

Introduction

DOE must ensure that it has the appropriate workforce and physical infrastructure to meet the national nuclear security goal now, and in the future. The construction of new facilities and maintenance of existing facilities is vitally needed to support other objectives within the National Nuclear Security Business Line. Workforce issues include staffing and training throughout DOE's national nuclear security enterprise, including support contractors.

To attract and retain a skilled workforce and to obtain the required funding for facilities, the public's trust in DOE's national nuclear security enterprise is needed. The Department must manage its national nuclear security programs in a safe, secure, cost-effective, and environmentally-sound manner.

The Objective's Measures

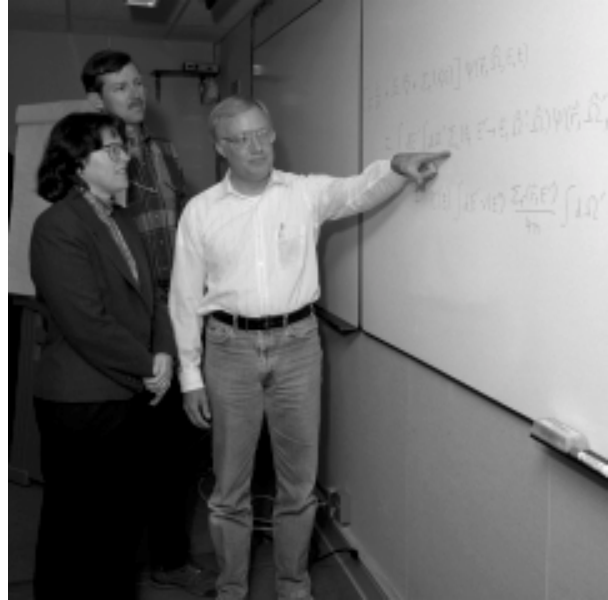
DOE has established the following performance measures. These measures provide the basis by which the Department will know that it has achieved the objective, or is making progress toward it. These measures will be translated into annual targets for performance plans and budgets for the Department.

- M Ensure the physical infrastructure and facilities are operational, safe, secure, and compliant, and that needed facilities sustain their specified state of readiness and capability to respond to emergencies.
- M Ensure a capability to resume underground nuclear testing within three years of a decision to do so, in accordance with the President's nuclear testing moratorium.
- M Ensure the availability of a workforce with the critical skills necessary to meet long-term mission requirements.
- M Maintain the DOE assets that support secure transportation of nuclear weapons and components.
- M Complete construction of the second arm of the Dual-Axis Radiographic Hydrodynamic Test Facility (DARHT) in FY 2002; complete construction and begin operation of the Tritium Extraction Facility (TEF) in FY 2006; complete construction of the Special Materials Complex in FY 2007; and complete construction of the National Ignition Facility (NIF) in FY 2008 in accordance with the cost rebaselining.
- M Achieve annual recurring cost savings from separation of workers that is at least three times the cost of separation.
- M Support local community transition activities that will create or retain, cumulatively, 20,000 to 25,000 new private sector jobs.

The Objective's Strategies

The following strategies describe the way in which the Department will work toward achieving this objective. These activities will be translated into annual budgets and performance plans for the Department.

- M Provide an appropriately-sized, cost-effective, safe, secure, and environmentally-sound enterprise for national nuclear security programs.
- M Maintain nuclear test readiness, in accordance with Presidential direction.
- M Implement the recommendations of the Commission on Maintaining U.S. Nuclear Weapons Expertise, which are consistent with commitments in the joint DOE/DoD *Report on Nuclear Expertise Retention Measures*.
- M Continue restructuring, modernizing, and implementing integrated safety and security management throughout the national nuclear security enterprise.
- M Continue with construction of new facilities such as the DARHT, the TEF, and the NIF, on schedule and on budget.



The national laboratories and production plants have established advanced degree and post-doctoral programs, as well as mentoring activities designed to further educate the next generation of stockpile stewards in nuclear weapons science.



The Dual-Axis Radiographic Hydrodynamic Test Facility (DARHT) at Los Alamos National Laboratory will examine the shape and size of an imploding pit model from two different directions, with greatly improved resolution.

OBJECTIVE NS4

Reduce the global danger from the proliferation of weapons of mass destruction (WMD).

Introduction

DOE contributes to enhancing national security by reducing the global danger from weapons of mass destruction. The Department provides policy leadership, technology development, and program implementation to:

- M Prevent the proliferation of WMD;
- M Detect WMD proliferation;
- M Monitor nuclear treaties and agreements;
- M Strengthen the nuclear nonproliferation regime;
- M Counter WMD terrorism;
- M Improve international nuclear safety; and
- M Reduce inventories of U.S. and Russian surplus weapons fissile materials in a transparent and irreversible manner.

To reduce the global danger from proliferation, DOE works with many agencies within the U.S. government, including the Department of State, Department of Defense, Customs Service, Justice, and USAID, the IAEA, the Russian Federation, the NIS, nine countries with Russian-designed nuclear reactor plants, USEC, Inc., and the Tennessee Valley Authority. Therefore, interagency collaboration and international cooperation in these efforts are vitally important to the success of DOE's activities in this area.

The Objective's Measures

DOE has established the following performance measures. These measures provide the basis by which the Department will know that it has achieved the objective, or is making progress toward it. These measures will be translated into annual targets for performance plans and budgets for the Department.

- M Provide leadership and technical support to interagency nonproliferation and arms control efforts to strengthen the international nonproliferation regime :
 - Support preparations for implementation of the Comprehensive Test Ban Treaty (CTBT), and completion of both negotiations for the Fissile Materials Cutoff Treaty (FMCT) and agreements for transparent dismantlement of nuclear warheads by the end of 2005.
 - Under the Nuclear Cities Initiative with Russia, accelerate the closure of two Russian nuclear weapons assembly/disassembly facilities.
 - Install sustainable physical security and accountancy upgrades to protect over 400 metric tons of weapons-usable nuclear material inadequately secured in more than 300 buildings at 80 Russian sites by 2010.

- Consolidate Russian weapons-usable nuclear material into fewer buildings at fewer sites and convert at least 20 metric tons of excess highly enriched uranium (HEU) to low enriched uranium (LEU) to reduce proliferation risks and overall security costs by 2015.
- Implement comprehensive reforms of DOE export control practices by 2002.
- M Demonstrate technologies to detect WMD proliferation including:
 - Conduct an integrated operational demonstration of biological agent detectors and hazard prediction models in an urban environment by 2002.
 - Perform an airborne demonstration of new technology for detecting WMD proliferation by 2005.
 - Deliver the first operational, next generation, space-based, optical nuclear explosion detector to the Air Force by 2005.
- M Improve the safety of 66 reactors at 21 Soviet-designed nuclear power plants and assist the nine countries with Russian-designed nuclear reactor plants to implement self-sustaining nuclear safety programs that include internationally accepted safety practices by 2006.
- M Eliminate surplus U.S. HEU within approximately 20 years primarily by down-blending the material to LEU for peaceful use as fuel for commercial reactors.
- M Eliminate surplus U.S. plutonium within approximately 20 years by irradiating it as mixed oxide fuel and converting some of the material to an immobilized form.
- M Implement a bilateral agreement with Russia to eliminate quantities of surplus Russian plutonium in rough parallel to U.S. reductions.
- M Ensure that the nonproliferation objectives of the Highly Enriched Uranium Purchase Agreement are achieved, including the primary objective of the conversion and down blending of 500 metric tons of weapons grade uranium derived from dismantled Russian nuclear weapons, into low enriched uranium over 20 years, i.e., by 2015.

The Objective's Strategies

The following strategies describe the way in which the Department will work toward achieving this objective. These activities will be translated into annual budgets and performance plans for the Department.

- M Materials Protection, Control, and Accounting:
 - Help Russia to install security upgrades and consolidate currently unsecured nuclear material into fewer buildings and sites.
 - Expand cooperation with the Russian Navy to include all nuclear material of proliferation concern.
 - Ensure the operational sustainability of installed material protection, control, and accounting (MPC&A) upgrades so that they provide long-term, continuing enhanced security.

- Help Russia to develop and support its infrastructure responsible for nuclear procedures, laws, inspections and training.

M Arms Control and Nonproliferation:

- As part of Initiatives for Proliferation Prevention and the “Nuclear Cities Initiative,” locally engage weapons scientists, engineers, and technicians in peaceful projects to prevent “brain drain” and foster economic diversification.
- Complete ratification and implementation of U.S. protocol for IAEA “Strengthened Safeguards System” and support U.S. responsibilities for declarations and on-site inspection at DOE facilities.
- Conduct analyses and technology development efforts for transparency activities (focusing on verified warhead dismantlement) to help ensure that nuclear reductions are transparent and irreversible.
- Work with Russian Customs through the Second Line of Defense program to combat trafficking of illicit nuclear material across border and control points.
- Maintain core competency as technical experts to U.S. government agencies on nuclear export control initiatives.



Under the Nuclear Cities Initiative Program, a scientist at the Avangard Electromechanical Plant in Sarov exhibits a kidney dialysis technology.



Nuclear Cities Initiative Director Bill Desmond (2nd from left), dedicating the Snezhinsk International Development Center with Russian officials.

M Nonproliferation and Verification R&D:

- Develop and demonstrate technologies needed to remotely detect the early stages of a proliferate nation’s nuclear weapons program.
- Improve capabilities to locate, identify, and characterize nuclear explosions.
- Produce operational satellite-based nuclear explosion monitoring sensor systems.
- In cooperation with the Russian Federation, develop capabilities to better detect radiation signatures from weapons material to prevent smuggling and to increase the transparency in weapons dismantlement.
- Improve the U.S. capability to detect the proliferation of chemical and biological agents at an early stage and to minimize the consequences if chemical or biological agents are used.

M International Nuclear Safety:

- Assist countries to reduce the risks from Soviet-designed nuclear power plants and implement self-sustaining nuclear safety improvement program capable of reaching internationally accepted safety practices.
- Implement projects in the areas of operational safety, training and simulators, safety assessments, and fire safety, and other hardware upgrades.
- Promote nuclear safety culture improvements internationally by providing strong leadership in

international nuclear safety organizations and centers.

- Work with other G-7 countries to assist in the shut down of the Chornobyl plant, to safely decommission it, and to stabilize the unit 4 shelter at Chornobyl.

M U.S. HEU Disposition:

- Transfer quantities of surplus U.S. HEU to USEC, Inc. and the Tennessee Valley Authority to make LEU fuel for commercial reactors; and over time, arrange for disposition of additional lots of surplus HEU through down-blending and commercial use.

M U.S. Plutonium Disposition

- M Implement the U.S. hybrid strategy for plutonium disposition in rough parallel with plutonium disposition in Russia, which includes the design, construction, and operation of three U.S. plutonium disposition facilities:

- A pit disassembly and conversion facility to convert surplus weapons plutonium to an unclassified oxide form suitable for disposition and international inspection.
- An immobilization facility using the can-in-canister approach to immobilize surplus “non-pit” plutonium in a ceramic material, that is then surrounded with vitrified high-level radioactive waste.
- A MOX fuel fabrication facility to convert oxide material into a MOX fuel; and irradiate the MOX fuel in existing, domestic, commercial reactors.

M Russian Plutonium Disposition:

- Cooperate with Russia in conducting tests and demonstrations of plutonium disposition technologies.
- Participate in U.S. government efforts to implement the provisions of the bilateral agreement with Russia for the disposition of surplus weapons plutonium.
- Assist in U.S. efforts to secure international financing to support plutonium disposition in Russia.
- Develop advanced reactor technology.
- Accelerate efforts under the Expanded Threat Reduction Initiative.
- Initiate and assist in the design of plutonium disposition facilities to be constructed in Russia.

M Russian HEU Transparency Implementation:

- Monitor the contracted quantity of HEU from dismantled Russian nuclear weapons, (currently 30 metric tons per year, blended down to LEU) to USEC, Inc., which is purchasing the material pursuant to the February, 1993 Agreement between the United States and the Russian Federation.
- Conduct special monitoring inspections in Russia and maintain permanent presence offices in Russia to be assured that the LEU being purchased by USEC, Inc. derives from HEU removed from dismantled nuclear weapons.

OBJECTIVE NS5

Provide the U.S. Navy with safe, militarily effective nuclear propulsion plants, and ensure their continued safe and reliable operation.

Introduction

This objective encompasses all Naval nuclear propulsion work, beginning with technology development, continuing through reactor operation and, ultimately, reactor plant disposal. Through Naval Reactors, a joint DOE/Navy program, the Department is ensuring the safe operation of the reactor plants in operating nuclear powered submarines and aircraft carriers comprising 40 percent of the Navy's major combatants, and is fulfilling the Navy's requirements for new reactors to meet evolving national defense demands. The long term development work accomplished under this objective ensures nuclear propulsion technology provides options to maintain and upgrade current capabilities, as well as meet future threats to U.S. security.

The Objective's Measures

DOE has established the following performance measures. These measures provide the basis by which the Department will know that it has achieved the objective, or is making progress toward it. These measures will be translated into annual targets for performance plans and budgets for the Department.

- M Ensure the safety, performance, reliability, and service life of operating reactors.
- M Develop new technologies, methods, and materials to support reactor plant design, including the next-generation submarine reactor, which will be complete by

FY 2004, and initiate detailed design efforts on a reactor plant for the next generation aircraft carrier, CVNX, construction of which will begin in 2006 and be complete by 2013.

- M Maintain outstanding environmental performance—ensure no personnel exceed Federal limits for radiation exposure and no significant findings result from environmental inspections by State and Federal regulators.

The Objective's Strategies

The following strategies describe the way in which the Department will work toward achieving this objective. These activities will be translated into annual budgets and performance plans for the Department.

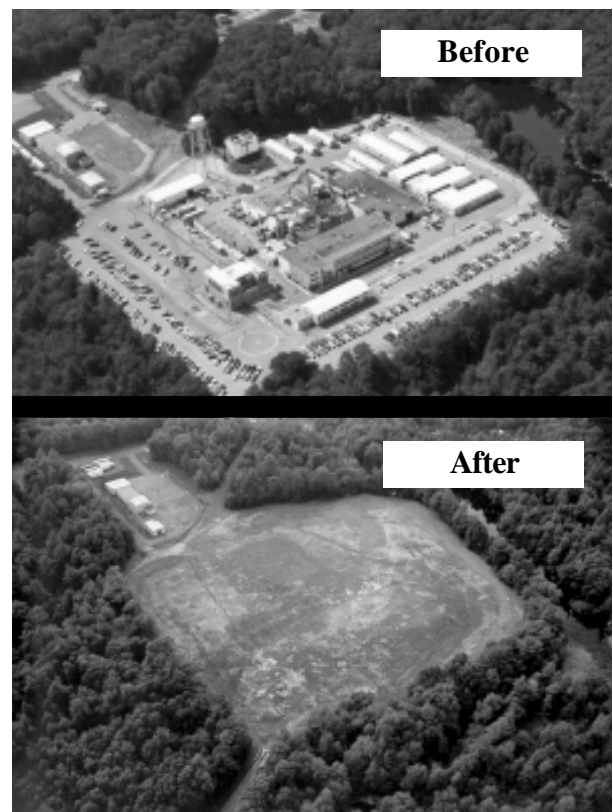
- M Conduct planned development, testing, examination, and evaluation of nuclear



USS ENTERPRISE (CVN 65) Salutes Naval Reactors – 50 Years of Excellence. (1998 photo)

fuel systems, materials, and manufacturing and inspection methods to ensure that Naval nuclear reactor plants are able to meet Navy goals for extended warship operation.

- M Complete scheduled design, analysis, and testing of reactor plant components and systems, including performance analysis to ensure the operational safety and reliability of reactor plants for use in Navy nuclear powered warships.
- M Accomplish planned core and reactor component/system design and technology development efforts to support the Navy's acoustic requirements.
- M In support of the Program's and Department's environmental cleanup goals, safely and responsibly inactivate the land-based, prototype Naval nuclear reactor plants that have been shut down.
- M Maintain a utilization factor of at least 90 percent for test reactor plants to ensure their availability for planned tests of cores, components, systems, materials, and operating procedures and for scheduled training; and provide for development of servicing equipment to help ensure reactor safety and reliability.
- M Maintain outstanding environmental performance through radiological, environmental, and safety monitoring and cleanup of Naval Reactors facilities.



The Windsor Site in Connecticut—from operational site to greenfield.

Objective NS6

Ensure that the Department's nuclear weapons, materials, facilities, and information assets are secure through effective safeguards and security policy, implementation, and oversight.

Introduction

DOE must ensure that its nuclear materials, facilities, and information assets are secure. Success in this objective requires the Department to have in place effective safeguards and security policies, vigilant implementation of those policies, and watchful oversight. The safeguards and security-related functions of the Department include physical security, cyber security, and emergency management. The Department's efforts include work with classification and declassification agencies (DoD, Defense Threat Reduction Agency, CIA, and State) as well as the emergency response agencies of the Federal government (NRC, FEMA, EPA, FBI, ATF, and the Public Health Service).

The Objective's Measures

DOE has established the following performance measures. These measures provide the basis by which the Department will know that it has achieved the objective, or is making progress toward it. These measures will be translated into annual targets for performance plans and budgets for the Department.

- M Prevent the theft or unauthorized loss of nuclear weapons, nuclear weapon components, special nuclear materials as well as classified and unclassified information and assets.
- M Reduce DOE site vulnerability and risk and national energy emergency vulnerabilities.

- M Consolidate DOE safeguards and security costs to facilitate improvements in planning, management, direction, tracking, and monitoring of the safeguards and security program.

The Objective's Strategies

The following strategies describe the way in which the Department will work toward achieving this objective. These activities will be translated into annual budgets and performance plans for the Department.

- M Develop and implement plans and policies to enhance security.
- M Develop and implement cost-effective technical solutions to protect DOE's critical assets, which include nuclear weapons in DOE custody, nuclear weapon components, special nuclear materials, classified information, and DOE facilities. Design and develop national energy-sector technical methodologies to enhance the protection of the sector's critical infrastructure assets, for example, addressing stability, countermeasures, and inter-sector interdependencies. Implement the Cyber/Computer Security Program Plan.
- M Maintain inventory control of plutonium (Pu), highly enriched uranium (HEU), and waste.
- M Effectively maintain information on visits and assignments by foreign nationals to DOE Federal and contractor sites.

- M Audit documents declassified by DOE and other agencies to ensure that nuclear weapon design information is not inadvertently released, and review DOE information to classify that which warrants protection in the interest of national security and declassify that which does not warrant such protection.
- M Reduce DOE facilities' vulnerability to chemical and biological threats through sensor development and chemical protective equipment.
- M Demonstrate improvement of a comprehensive emergency management system whose function is to ensure effective Departmental response to all DOE emergencies. Maintain robust emergency response assets in accordance with Presidential Decision Directives, the Atomic Energy Act, Executive Orders, and Federal emergency plans.
- M Conduct safeguards and security evaluations at 20 major sites and perform continuous cyber security inspections and no-notice reviews at 14 major Departmental sites to provide an independent assessment of the status of safeguards and security programs for the Secretary and to establish a baseline of findings.
- M Perform regular assessments of emergency management programs at DOE sites.
- M Strengthen the ability to manage safeguards and security as an activity that has a specifically identified budget and the ability to enhance awareness of safeguards and security issues throughout the NNSA and the DOE complex.

Linkage to Budget Structure

The National Nuclear Security general goal is supported by seven objectives. Each objective is being pursued through long-term strategies. DOE's Budget Decision Units fund work in pursuit of those long-term strategies. The annual performance measures are discussed with the Decision Units in the Annual Performance Plan, which is submitted with the budget for each fiscal

year. The following chart shows the relationship between Decision Units and objectives. However, the consolidation of funding for safeguards and security (Objective NS6) has not been completed. Therefore, for FY 2001 many programs fund these efforts.

